



# NOAA Fleet Update

**July 2019**

The following update provides the status of NOAA's fleet of ships and aircraft, which play a critical role in the collection of oceanographic, atmospheric, hydrographic, and fisheries data. NOAA's current fleet of 16 ships – the largest civilian research and survey fleet in the world – and nine aircraft, are operated, managed, and maintained by NOAA's Office of Marine and Aviation Operations ([OMAO](#)). OMAO includes civilians, mariners, and officers of the United States NOAA Commissioned Officer Corps ([NOAA Corps](#)), one of the nation's seven Uniformed Services.



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# OMAO in the News



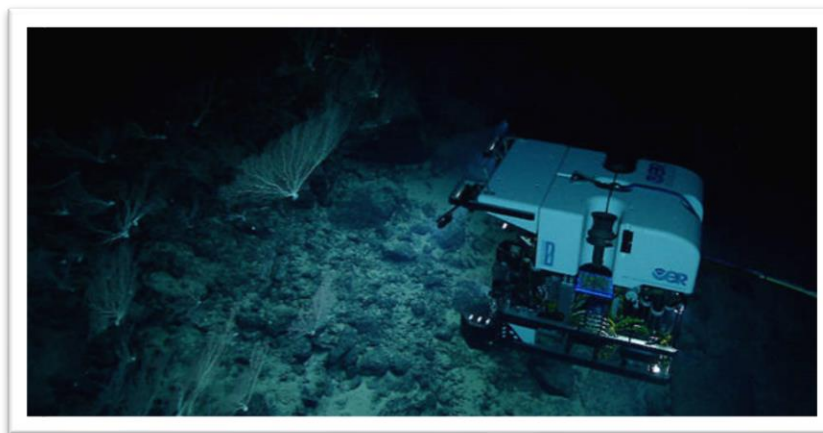
[Storm chaser flies into hurricane eye. 'It was beautiful'](#) June 11, 2019; E&E News. Veteran hurricane scientist, Wen-Chau Lee, reminisces on his first hurricane flight in 1995, talks about the field of airborne weather radar and the prototype his laboratory is developing, and what it may mean for NOAA's ability to research storms.



NOAA WP-3D Orion.

[Photo Credit: NOAA]

[NOAA is Livestreaming A Deep Sea Expedition and It's Pretty Amazing](#) June 28, 2019; KQED Science. Ocean exploration scientists aboard NOAA Ship *Okeanos Explorer* are livestreaming video from a remotely-operated, deep water vehicle every day until the end of the ship's cruise on July 11.



Deep Discoverer, a remotely operated, underwater roving vehicle, observing deep water corals.

[Photo Credit: NOAA]



# NOAA Commissioned Officer Corps



OMAO and the NOAA Corps are an integral part of NOAA and our officers operate OMAO's research and survey fleet of 16 ships and nine aircraft. Mission areas can range from launching a weather balloon at the South Pole, conducting hydrographic or fishery surveys in Alaska, maintaining buoys in the tropical Pacific, flying snow surveys over the Midwest, or flying our "Hurricane Hunter" aircraft into, or above, hurricanes.

## Applications Being Accepted and interview status

Interviews for BOTC applicants and Inter-Service Transfer (IST) candidates with experience as P-3 pilots and navigators were held until June 28<sup>th</sup>. Both BOTC 135 and IST selection boards are expected to convene at the end of July. Additional information may be found on the [NOAA Corps website](#).

## Recruiting Events

The recruiting team is preparing for a heavy fall recruiting season to begin August 2019.



BOTC 133

[Photo Credit: NOAA]



## Basic Officer Training Class 134



Preparations are well underway at the NOAA Corps Officer Training Class (NCOTC) to welcome BOTC 134. Sixteen new ensigns will swear in on July 22nd and report to the training center at the U.S. Coast Guard Academy in New London, CT on July 24th. The four months of training they will receive focus primarily on seamanship and leadership, and will include experiences aboard multiple training platforms, including two weeks underway on U.S. Coast Guard Barque *EAGLE*. Prior to the arrival of the class, NCOTC staff has been actively engaged in professional development and maintaining underway proficiency.



BOTC 121 Graduation Ceremony, May 2013.

[Photo Credit: NOAA]



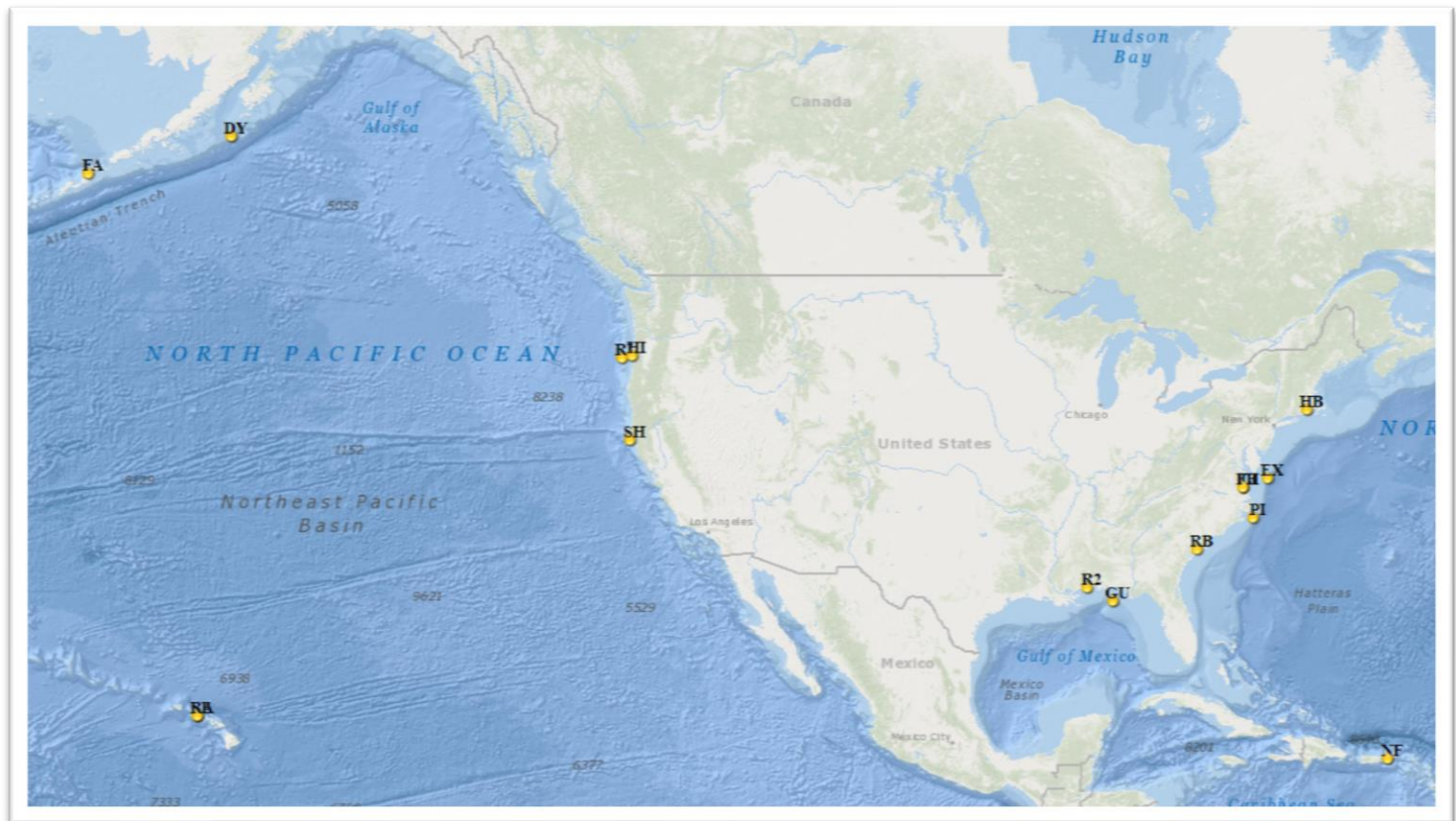


# OMAO's Ships and Centers



OMAO's [Ship Tracker](#) shows information about the present location of our fleet of research and survey ships. Please note: To access Ship Tracker you must have an account with a .gov or .mil email address. All other access is restricted.

OMAO's ships and related Marine Centers are listed below based on the geographical location of the vessels' homeports starting in the Northeast and ending in the Pacific.



NOAA Ship locations in early July, 2019.

[Photo Credit: NOAA]

## National

### OMAO'S MARINE OPERATIONS

Director of Marine Operations: Mr. Troy Frost

OMAO's Marine Operations oversees the operations of OMAO's ships and the three regional Centers, including the Marine Operations Center-Pacific, Marine Operations Center-Atlantic, and Marine Operations Center-Pacific Islands. Employees of Marine Operations are stationed nationwide to provide strategic, administrative, engineering, maintenance, electronic, budgetary, and personnel support to the OMAO fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.



## New Castle, New Hampshire

### NOAA Ship *Ferdinand R. Hassler*

**Commanding Officer:** Lieutenant Commander Mark Blankenship

**Primary Mission Category:** Hydrographic Surveys

**Depart:** Norfolk, Virginia

**Arrive:** Port Canaveral, Florida

**Ship Status:** Underway calibrating ship's systems in Chesapeake Bay, and conducting hydrographic surveys in the approach area to Jacksonville, Florida.

## Newport, Rhode Island

### NOAA Ship *Henry B. Bigelow*

**Commanding Officer:** Captain William Mowitt

**Primary Mission Category:** Fisheries Research

**Depart:** Newport, Rhode Island

**Arrive:** Newport, Rhode Island

**Ship Status:** Alongside for Mid-Season Repair Period in Newport, RI. Departing for Mesopelagic Exploration with Deep-See, to test acoustical and optical sensors on Deep-See, and characterize surface layer plankton in the meso and bathypelagic layers down to 1,500 m in the off-shelf regions east of Georges Bank and Bear Seamount.



NOAA Ship *Henry B. Bigelow*

[Photo Credit: NOAA]

## North Kingstown (Davisville), Rhode Island

### NOAA Ship *Okeanos Explorer*

**Commanding Officer:** Commander Nicole Manning

**Primary Mission Category:** Oceanographic Exploration and Research

**Depart:** Norfolk, Virginia

**Arrive:** North Kingstown, Rhode Island

**Ship Status:** Underway for the Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE) South Atlantic Bight ROV and Mapping to perform deep sea mapping operations within the U.S. EEZ. Departing from Norfolk, Virginia for ASPIRE Galway Mid-Atlantic Ridge Mapping.

## Norfolk, Virginia

### NOAA Ship *Thomas Jefferson*

**Commanding Officer:** Commander Briana Hillstrom

**Primary Mission Category:** Hydrographic Surveys

**Inport:** Brooklyn, New York

**Ship Status:** Alongside shipyard in Brooklyn, NY. Planned departure 8/15/2019 for calibration of the ship's hydrographic survey systems in the Chesapeake Bay region.

### OMAO'S MARINE OPERATIONS CENTER – ATLANTIC (MOC-A)

**Commanding Officer:** Captain David Zezula

MOC-A serves as homeport for NOAA Ship *Thomas Jefferson*. Its personnel provide administrative and logistical support and manage the day-to-day operations for the research and survey ships in NOAA's Atlantic and Gulf of Mexico fleet of nine vessels. Each year, these ships conduct dozens of missions, to assess marine ecosystems including fish and marine mammal stocks, coral reef research, collect seafloor data to update nautical charts, and explore the ocean.



OMAO's Marine Operations Center – Atlantic in Norfolk, Virginia.

[Photo Credit: NOAA]

## Charleston, South Carolina

### NOAA Ship *Nancy Foster*

**Commanding Officer:** Lieutenant Commander James Brinkley

**Primary Mission Category:** Oceanographic Research, Environmental Assessment

**Depart:** San Juan, Puerto Rico

**Arrive:** St. Thomas, U.S. Virgin Islands

**Ship Status:** Underway for Mapping Essential Fish Habitat in the US Caribbean to inform Marine Protected Area Management.



*NOAA Ship Nancy Foster*

[Photo Credit: Lieutenant Connor Maginn, NOAA]

### NOAA Ship *Ronald H. Brown*

**Commanding Officer:** Captain Daniel Simon

**Primary Mission Category:** Oceanographic Research, Environmental Assessment

**In port:** Charleston, South Carolina

**Ship Status:** Unscheduled repairs to port Z-drive, essential component of ship's propulsion system. OMAO has determined the best course of action for completing the motor repair on NOAA Ship Ronald H. Brown is to add the motor repair statement of work to the previously planned dry dock repair package scheduled for August 4 - November 4, 2019.

## Pascagoula, Mississippi

### NOAA Ship *Pisces*

**Commanding Officer:** Commander Patrick Murphy

**Primary Mission Category:** Fisheries Research

**Depart:** Morehead City, North Carolina

**Arrive:** Morehead City, North Carolina

**Ship Status:** Underway for Southeast Fishery-Independent Survey (SEFIS) to conduct stock assessments for

economically important reef fishes along the southeast US Atlantic coast.



*NOAA Ship Pisces*

[Photo Credit: NOAA]

#### [NOAA Ship Oregon II](#)

**Commanding Officer:** Master David Nelson

**Primary Mission Category:** Fisheries Research

**Depart:** Galveston, Texas

**Arrive:** Pascagoula, Mississippi

**Ship Status:** Underway for Southeast Area Monitoring and Assessment Program (SEAMAP) Summer Groundfish in the Gulf of Mexico. The objective of this project is to sample the northern GOM with standard trawl sampling gear to determine the abundance and distribution of benthic fauna.

#### [NOAA Ship Gordon Gunter](#)

**Commanding Officer:** Lieutenant Commander Christopher Skapin

**Primary Mission Category:** Fisheries Research

**Depart:** Pascagoula, Mississippi

**Arrive:** Pascagoula, Mississippi

**Ship Status:** Underway for Gulf of Mexico Bryde's Whale survey to collect data related to the Gulf of Mexico Bryde's whale and its habitat using a variety of techniques, including photogrammetry via small Unmanned Aerial System (sUAS), handheld cameras, skin and blubber biopsies, recoverable short-term acoustic and/or video recording tags, non-recoverable satellite position tags, eDNA collection, visual observation, near bottom mid-water trawls and extensive fisheries acoustic surveys.

## San Diego, California

### NOAA Ship *Reuben Lasker*

**Commanding Officer:** Commander Chad Cary

**Primary Mission Category:** Fisheries Research

**Depart:** San Francisco, California

**Arrive:** San Diego, California

**Ship Status:** Underway conducting West Coast Pelagic Fish Survey. This project studies the distribution and abundance of coastal pelagic fish, their prey, and habitat along the California Current from Vancouver Island, Canada to San Diego, CA. The study primarily focuses on Pacific Sardine, Northern Anchovy, Pacific Mackerel and Pacific Herring.



NOAA Ship *Reuben Lasker* in vicinity of R/V *Rachel Carson* (left) and R/V *Western Flyer* (middle) in Monterey, CA.

[Photo Credit: Lieutenant David Wang, NOAA]

## Newport, Oregon

### NOAA Ship *Rainier*

**Commanding Officer:** Commander Benjamin Evans

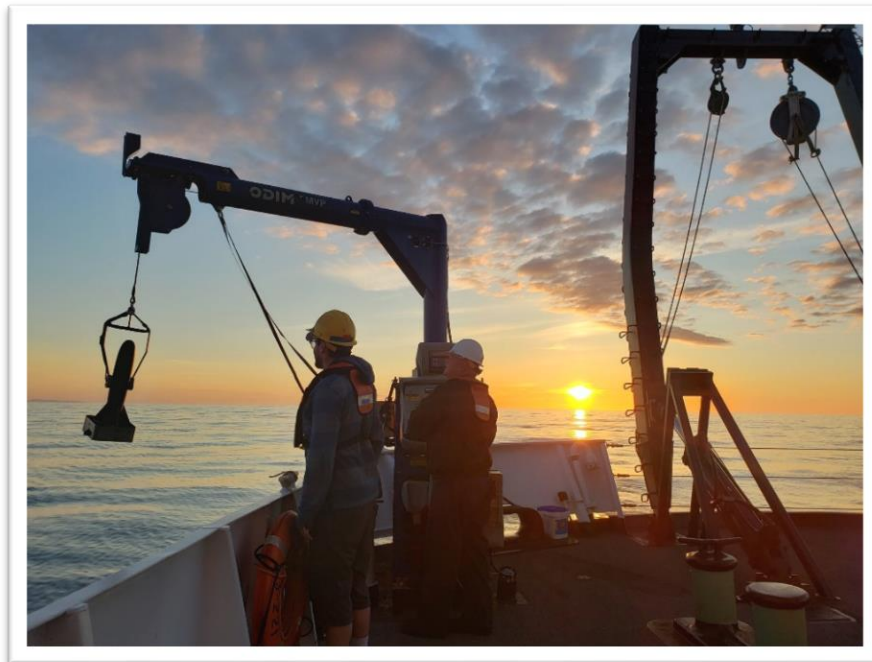
**Primary Mission Category:** Hydrographic Surveys

**Depart:** Honolulu, Hawaii

**Arrive:** Honolulu, Hawaii

**Ship Status:** Underway in support of Northwest Hawaiian Islands Coral Reef project. This project is necessary to survey and study the coral ecosystems of Northwest Hawaiian Islands. This also meets requirement for characterization, monitoring and research in accordance with National Marine Sanctuaries Act continuing a ten-year time series study detecting effects of large-scale global changes such as climate change, ocean acidification, invasive species, etc. This project will allow early identification and mitigation of threats to Papahānaumokuākea Marine National Monument and surrounding environment.





NOAA Ship *Rainier* personnel deploy the moving vessel profiler while surveying near Chiniak, Alaska.  
[Photo Credit: Lieutenant Hadley Owen, NOAA]

#### [NOAA Ship \*Bell M. Shimada\*](#)

**Commanding Officer:** Captain Arthur Stark

**Primary Mission Category:** Fisheries Research

**Depart:** Newport, Oregon

**Arrive:** Newport, Oregon

**Ship Status:** Underway for Integrated Ecosystem and Pacific Hake Trawl Survey. This project is a combined U.S.-Canada survey of Pacific Hake (*Merluccius productus*). The purpose of the project is to provide independent hake biomass information to stock assessors to manage sustainable harvest levels for hake in accordance with International Hake Treaty.



NOAA Ship *Bell M. Shimada* deck crew prepare the net prior to Hake trawls.  
[Photo: Lieutenant Jesse Milton, NOAA]



## OMAO'S MARINE OPERATIONS CENTER – PACIFIC (MOC-P)

**Commanding Officer:** Captain Michael Hopkins

MOC-P serves as a homeport for two NOAA ships. Its personnel provide administrative and logistical support, and manage the day-to-day operations, for the research and survey ships in NOAA's Pacific fleet. Each year, these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean. MOC-P also serves as the home of OMAO's Marine Operations.



Visiting WHOI R/V Atlantis and ROV JASON offloaded for maintenance at MOC-P warehouse.

[Photo: Lisa Evans, NOAA]

## **Ketchikan, Alaska**

### NOAA Ship Fairweather

**Commanding Officer:** Commander Marc Moser

**Primary Mission Category:** Hydrographic Surveys

**Depart:** Dutch Harbor, Alaska

**Arrive:** Newport, Oregon

**Ship Status:** Underway conducting hydrographic surveys in the Bristol Bay region of Alaska. Primary areas of concern are Cape Newenham and Cape Pierce. Much of the hydrographic data for this area was collected in the 1920s. Updated data will help support maritime commerce required to support industry and commerce in the communities near Bristol Bay.

## **Kodiak, Alaska**

### NOAA Ship Oscar Dyson

**Commanding Officer:** Commander Sarah Duncan

**Primary Mission Category:** Fisheries Research

**Depart:** Kodiak, Alaska

**Arrive:** Kodiak, Alaska

**Ship Status:** Underway for Walleye Pollock Gulf of Alaska Summer Survey. This survey provides pollock abundance estimates for Gulf of Alaska shelf. These assessments are critical to provide recommendations to the North Pacific Fisheries Management Council for sustainable harvest limits.



NOAA Ship *Oscar Dyson*'s view of Mount Shishaldin volcano during the Pollock Survey.

[Photo Credit: Commander Sarah Duncan, NOAA]

## Honolulu, Hawaii

### NOAA Ship *Hi'ialakai*

**Commanding Officer:** Commander Colin Little

**Primary Mission Category:** Oceanographic Research, Environmental Assessment

**In port:** Newport, Oregon

**Ship Status:** The ship is currently alongside at MOC-P in a layup status.

### NOAA Ship *Oscar Elton Sette*

**Commanding Officer:** Commander Héctor Casanova

**Primary Mission Category:** Fisheries Research

**Departure:** Honolulu, Hawaii

**Arrival:** Honolulu, Hawaii

**Ship Status:** Underway for Main Hawaiian Islands Life History Research - During this project scientists conduct fishery-independent life history and ecological research on the biological dynamics of commercially important deep-water bottomfishes in the Main Hawaiian Islands. The ship's next project is leg 2 of Hawaiian Archipelago Reef Assessment and Monitoring Program. The focus of this project is to provide scientific information that supports ecosystem approaches to management and conservation of coral reefs.



NOAA Ship *Oscar Elton Sette* off the coast of Maui

[Photo Credit: Raymond Boland, NOAA]

### OMAO'S MARINE OPERATIONS CENTER – PACIFIC ISLANDS (MOC-PI)

**Commanding Officer:** Commander Jeffrey Shoup

MOC-PI serves as a homeport for two NOAA ships. Its personnel provide administrative and logistical support, and manage the day-to-day operations for the ships in NOAA's Pacific Islands fleet and for ships operating in the western Pacific. Each year, these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.



NOAA's MOC-PI (Ford Island; Honolulu, Hawaii) with NOAA ship *Oscar Elton Sette* alongside

[Photo Credit: Lieutenant (Junior Grade) Christopher Gallagher, NOAA]



# OMAO's Aircraft



## Lakeland, Florida

NOAA's fleet of nine manned aircraft is based at OMAO's Aircraft Operations Center ([AOC](#)). Located at Lakeland Linder Regional Airport in Lakeland, Florida, the officers, crew, and scientists from AOC provide capable, mission-ready aircraft and professional crews to the scientific community. AOC is committed to the safe, efficient and economical use of NOAA aircraft and has more than four decades of experience developing, coordinating and successfully and safely conducting airborne environmental data gathering missions. OMAO's aircraft fleet includes the following platforms and the web links provide additional photos, information on each aircraft, and the missions they serve:

### [P-3 "Hurricane Hunter" \[Tail ID# N42RF\]](#)

The aircraft is hurricane ready and standing by for tasking. The aircraft will also support the [EAA Oshkosh Airventure](#) from July 24-26.



NOAA P-3

[Photo Credit: Michael Mascaro, NOAA]

### [P-3 "Hurricane Hunter" \[Tail ID# N43RF\]](#)

Instrumentation and outfitting will continue at AOC until the aircraft is operationally and mission-ready on July 15.

### [G-IV "Hurricane Hunter" \[Tail ID# N49RF\]](#)

The aircraft is currently undergoing unscheduled maintenance. The aircraft will be mission ready on July 18.



NOAA G-IV

[Photo Credit: NOAA]

**King Air [Tail ID# N68RF]**

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from the [NOS, NGS Coastal Mapping Program](#)

**What:** Coastal mapping flights

**When:** July 8 - September 30

**Where:** TBD based on weather and tide stages.

**Why:** These flights provide critical baseline data to help accurately map the U.S. shoreline. The data are important for national security, maritime shipping, and navigation.



NOAA King Air

[Photo Credit: NOAA]

**Jet Prop Commander [Tail ID# N45RF]**

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from the [NOS, NGS Grav-D Program](#)

**What:** GRAV-D

**When:** Present - September 15

**Where:** Ontario, California; Reno, Nevada; and Grand Junction, Colorado. The aircraft will conduct flights over the Southwest U.S.

**Why:** Grid pattern flight lines will be flown at 20,000 feet over the Southwest United States while collecting GPS and inertial data to update the U.S. vertical datum. A vertical datum is a base measurement point (or set of points) from which all elevations are determined.



Jet Prop Commander

[Photo Credit: NOAA]

**Twin Otter [Tail ID# N46RF]**

Pilot training is scheduled for July 1-14 at AOC

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from [NOAA's Earth System Research Laboratory \(ESRL\), Chemical Sciences Division \(CSD\)](#).

**What:** Fire Winds (FIREX)

**When:** July 15 - August 15

**Where:** Western U.S.

**Why:** The research program proposed here outlines a comprehensive research effort to understand and predict the impact of North American fires on the atmosphere and ultimately support better land management.

**Twin Otter [Tail ID# N48RF]**

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from [NOS, NGS Coastal Mapping Program](#).

**What:** Coastal mapping flights

**When:** Present - July 14

**Where:** Florida Gulf coast.

**Why:** These flights provide critical baseline data to help accurately map the U.S. shoreline. The data are important for national security, maritime shipping, and navigation.

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from [ESRL, CSD](#).

**What:** Fire Winds (FIREX)

**When:** July 15 - September 12

**Where:** Western U.S.

**Why:** The research program proposed here outlines a comprehensive research effort to understand and predict the impact of North American fires on the atmosphere and ultimately support better land management.

**Twin Otter [Tail ID# N56RF]**

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from [National Marine Fisheries Service \(NMFS\) Alaska Regional Office \(ARO\)](#).

**What:** Alaska Steller Sea Lions

**When:** June 21 - July 12

**Where:** Sitka, Kodiak and Homer, Alaska



**Why:** As part of the Marine Mammal Protection Act, the purpose of this project is to monitor the western population stock and recovery efforts of Steller Sea Lions from Endangered Species status.

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from the [Office of Oceanic and Atmospheric Research](#) and the [Pacific Marine Environmental Laboratory \(PMEL\)](#).

**What:** Arctic Heat

**When:** July 15 - July 24

**Where:** Chukchi and Beaufort Seas, Alaska

**Why:** The purpose of this project is to perform near-surface data collection that will lead to improvements in weather and sea-ice forecasting in the Pacific Arctic.



Twin Otter, N56RF, and crew in Utqiagvik, Alaska, June 2019.

[Photo Credit: PMEL, NOAA]

#### **[Twin Otter](#) [Tail ID# N57RF]**

**Who:** Officers and crew of OMAO/NOAA Corps along with scientists from [NMFS Northeast Fisheries Science Center](#)

**What:** Northeast North Atlantic Right Whale Surveys

**When:** Present - September 12

**Where:** Moncton, New Brunswick, Canada

**Why:** The objectives of this project are to provide real time sighting information to commercial shipping interests in an effort to reduce ship collisions, to better understand the distribution and abundance, and to collect photographic images of the critically endangered North Atlantic Right Whales. With as few as 400 remaining, surveillance flights to track their migration patterns are important for conservation and recovery efforts.



Twin Otter

[Photo Credit: NOAA]

### Unmanned Aerial System (UAS) Section

The UAS Section provides nationwide policy input, oversight, and guidance for all of NOAA's UAS operations. The UAS Section of AOC is staffed by a team of aviation professionals who specialize in operational UAS implementation. The UAS Section tracks all small UAS (sUAS) operations for NOAA to include aircraft hours, types, pilot qualifications, and pilot training. The UAS Section also coordinates airspace approvals for operations within the United States National Airspace System, special use airspace, and foreign airspace. AOC conducts a thorough review of all projects by applying established risk management procedures to UAS missions, including an airworthiness review of all aircraft. This support is provided to NOAA Line Offices and partners to further develop and refine the use of sUAS for NOAA's research and data collection.

### OMAO'S AIRCRAFT OPERATIONS CENTER (AOC)

**Commanding Officer:** Captain Timothy Gallagher

The AOC, located at Lakeland Linder Regional Airport in Lakeland, Florida, serves as the main base for OMAO's fleet of nine aircraft and provides capable, mission-ready aircraft and professional crews to the scientific community. Whether studying global climate change or acid rain, assessing marine mammal populations, surveying coastal erosion, investigating oil spills, flight checking aeronautical charts, or improving hurricane prediction models, the AOC flight crews continue to operate in some of the world's most demanding flight regimes.



AOC personnel and aircraft in the hangar at the NOAA Aircraft Operations Center in Lakeland, Florida

[Photo Credit: NOAA]



# Unmanned Systems Support



## Nationwide

### APH-22 Hexacopter

**Location:** Muskeget Island, Massachusetts

**Mission:** NEFSC Muskeget Grey Seal Pupping Survey

The Northeast Fisheries Science Center has been approved to conduct survey flights over Grey Seal colonies throughout FY19. Images collected will be used to assess Grey Seal health and population.

**Location:** Oahu, Hawaii

**Mission:** PIFSC APH-22 Training

The Pacific Islands Fisheries Science Center utilizes the location at the Kawaiinui Model Airplane Field to conduct training and proficiency flights. This allows APH-22 operators to maintain proficiency for future operations at a reduced cost. Training flights are also approved from NOAA small boats.

**Location:** Sea Life Park and Dolphin Quest; Oahu, Hawaii

**Mission:** PIFSC Cetacean Research Program

Images taken by the APH-22 are used to collect photogrammetric measurements of captive cetaceans. Photogrammetric measurements are compared with the known manual measurements to determine accuracy. Consistent trade winds can make image collection difficult. Practices found to improve image quality and accuracy can be used to improve operations over wild populations.

### APH-22 Hexacopter/APH-28 Hexacopter

**Location:** NOAA Aircraft Operations Center

**Mission:** New Aircraft

The NOAA Aircraft Operations Center acquired 1 APH-22 and 1 APH-28 for training, testing and fleet support. Training flights will be conducted monthly.

**Location:** Western Regional Center, NOAA Campus; Seattle, Washington

**Mission:** AFSC Training Site

Alaska Fisheries Science Center has been approved to conduct proficiency training, manufacturer training, and payload calibration flights at the Western Regional Center-Seattle, NOAA Campus. These flights will allow AFSC to remain proficient and prepare for upcoming projects.

**Location:** Adak to Attu, Alaska

**Mission:** Marine Mammal Surveys

The Marine Mammal Laboratory is scheduled to conduct Marine Mammal surveys using the APH-22 and APH-28 throughout the month of July. Bogoslof Island, NW of Dutch Harbor, is scheduled for August.

**Location:** California

**Mission:** California Sea Lion and Fur Seal

The Marine Mammal Laboratory is approved to conduct Marine Mammal surveys using the APH-22 and APH-28 on a yearly basis throughout the California coastline habitat.

**Location:** Atlantic Northeast

**Mission:** NEFSC Right Whale Cruise

Northeast Fisheries Science Center will be conducting flights in class G airspace in offshore waters during the month of May. Flights will be conducted from a 90' research vessel or an 18' rigid hull inflatable boat ("rhib") launched from the vessel to collect aerial images of North Atlantic Right Whales.

**Location:** Gulf of Mexico

**Mission:** NEFSC Bryde's Whale

Flights were conducted off NOAA Ship *Gordon Gunter* in the Gulf of Mexico to collect aerial images of Bryde's Whales.

### **APH-22 Hexacopter/APH-28 Hexacopter/APO-42 Octocopter**

**Location:** Jamul, California

**Mission:** Jamul BLM Area

Southwest Fisheries Science Center has been approved to conduct training and proficiency flights in Jamul, California. This training site is owned by US Fish and Wildlife. This will allow pilots to practice landing, following a target, and approaching to collect blow samples.

**Location:** Puget Sound, Washington

**Mission:** Southern Resident Killer Whale Condition

Southwest Fisheries Science Center will be conducting flights to collect images of Southern Resident Killer Whales to assess changes in body condition and growth of individual whales. Images and blow samples may also be collected from Humpback and Grey Whales. Flights will be conducted from a 31' catamaran.

### **SenseFly eBee RTK**

**Location:** Muskeget Island, Massachusetts

**Mission:** NMFS/Remote Sensing Division Grey Seal Habitat

Sensefly eBee will be used to conduct Grey Seal habitat mapping and population assessment flights over Muskeget Island.

**Location:** Corbin, Virginia

**Mission:** NGS/RSD/US Army Corps of Engineers

The National Geodetic Survey RSD hosted the USACE at their facility in Corbin, Virginia for a series of test flights. RSD and USACE are expected to partner with training and operational methods.

### **FireFLY6 PRO**

**Location:** Oahu, Hawaii

**Mission:** PIFSC Proficiency Training

The Kawaiinui model airplane field will be used monthly to perform proficiency flights for PIFSC operators. The main objective will be to practice hand launches, recoveries and locating targets. These flights are essential in providing the necessary skills needed for successful operations.

### 3DR Solo

**Location:** MOC-P Bell M. Shimada

**Mission:** Public Outreach and ship inspection

The UAS will proceed to take aerial photographs from the MOC-P pier and the deck of *Bell M. Shimada*. An FAA Certificate of Authorization (COA) has been granted for operations in the Class E airspace around MOC-P. AOC has received and installed updated software that will allow marine based UAS operations. An updated Solo has been shipped to *Bell M. Shimada*.

**Location:** Roanoke and Charleston WFO

**Mission:** New mission

3DR Solos are expected to be deployed to these Weather Forecast Offices for the National Weather Service to integrate UAS into their mission. A project plan including training and scope is currently under development.

### HQ-55 Latitude

**Location:** Lakeland, Florida

**Mission:** Research

The HQ-55 Latitude is a new vehicle currently in development for NOAA. This new vehicle deployed on the NOAA Ship *Ronald H. Brown* in May 2019. The aircraft was selected to support the ATOMIC 2020 project, a shipboard Caribbean deployment, in January-February of 2020. OMAO and the UASPO are negotiating a services contract with the aircraft vendor.

### Blackswift S-2/Meteodrone SSE/MD4-1000/S-1000

**Location:** Oak Ridge, Tennessee

**Mission:** Calibration and Proficiency

Atmospheric Turbulence and Diffusion Division (ATDD) is approved to use Knox County Radio Control Society (KCRC) and House Mountain Radio Control Field (HMRC) sites to conduct calibration and vertical profile flights up to 1200 feet above ground level (AGL). These flights will allow ATDD to test and calibrate scientific instruments before use on their upcoming projects.

### Blackswift S-2/Meteodrone SSE/S-1000

**Location:** Oak Ridge, Tennessee

**Mission:** Instrument Testing and Calibration

A combination of these will be used to conduct flights to in a science experiment at Oliver Springs Airport up to 3500' in altitude. A COA is in the final stages of approval with operations scheduled for August.

**Location:** Park Falls, Wisconsin

**Mission:** CHEESEHEAD Project

ATDD, with AOC support, will deploy to Wisconsin in July for a series of experiments using this combination of UAS. Research flights are expected to be conducted through August. Flights will be operated under one of AOC's existing Certificate of Authorizations.

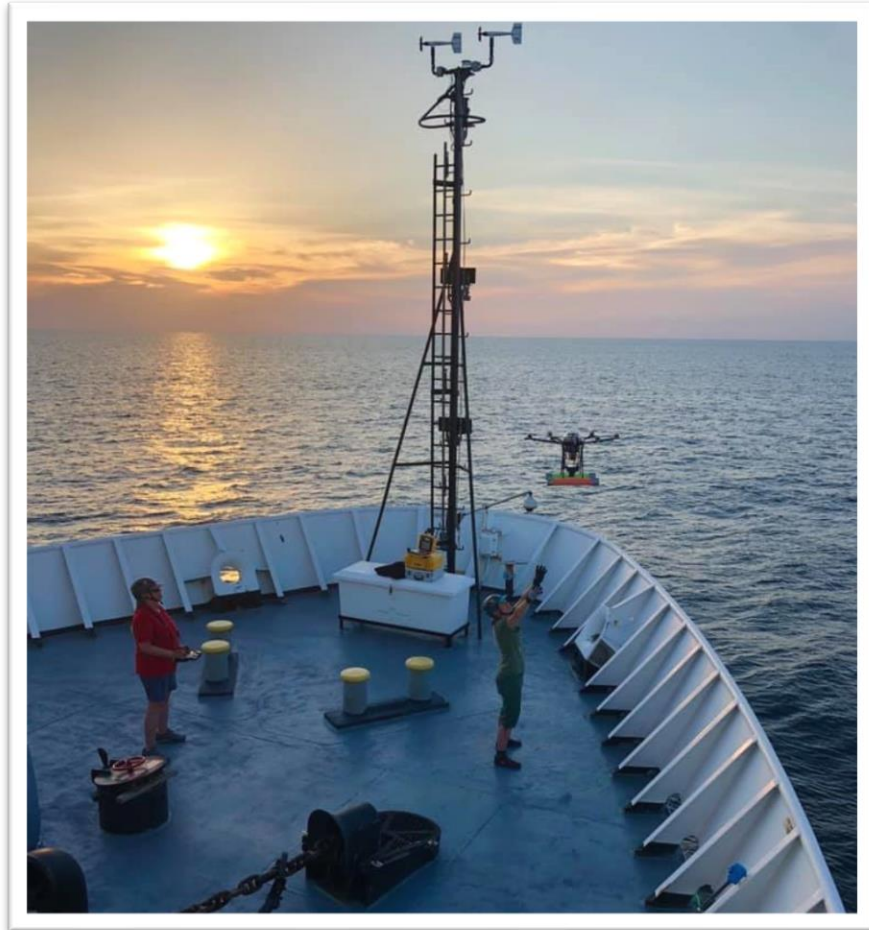


## P-3 Deployed UAS

**Location:** Aircraft Operations Center

**Mission:** P-3 Deployed UAS

AOC, Hurricane Research Division (HRD) and the UAS Program Office are currently exploring new vehicle options for a hurricane deployed UAS.



A team of NOAA researchers launches a UAS from NOAA Ship *Gordon Gunter*.

[Photo Credit: Jeff Angleberger, CME/NOAA]





# OMAO Partnerships



OMAO and the NOAA Commissioned Officer Corps provide key services and leadership to a number of federal agencies and external partners to help them meet their mission – and ours – and to better leverage federal resources.

## United States House of Representatives - Natural Resource Committee

**Location:** Washington, District of Columbia

**Detail:** Lieutenant Commander Zachary Cress

Lieutenant Commander Cress is currently on detail with the staff to the Committee Chair, Representative Raúl M. Grijalva (D-AZ), where he is assisting on activities pertaining to the Committee's work on oversight and authorization of NOAA programs, as well as other matters within the Committee's jurisdiction.

## National Science Foundation (NSF)

**Location:** South Pole, Antarctica

**Embedded Liaison:** Lieutenant (junior grade) Timothy Holland

Members of the NOAA Commissioned Officer Corps carry out NOAA's mission in remote locations across the globe. LTJG Holland is assigned to Antarctica where he serves as the Station Chief for NOAA's Atmospheric Research Observatory (ARO) at the Amundsen-Scott South Pole Station. The ARO at the Amundsen-Scott South Pole Station is a National Science Foundation facility used in support of scientific research related to atmospheric phenomena.

## Department of Defense – U.S. Pacific Command

**Location:** Honolulu, Hawaii

**Embedded Liaison:** Captain Barry Choy

The U.S. Pacific Command (USPACOM) area of responsibility encompasses approximately half the earth's surface and more than half of its population. The 36 nations that comprise the Asia-Pacific include: two of the three largest economies and nine of the ten smallest; the most populous nation; the largest democracy; the largest Muslim-majority nation; and the smallest republic in the world. The region is a vital driver of the global economy and includes the world's busiest international sea lanes and nine of the ten largest ports. By any meaningful measure, the Asia-Pacific is also the most militarized region in the world, with seven of the world's ten largest standing militaries and five of the world's declared nuclear nations. Under these circumstances, the strategic complexity facing the region is unique. CAPT Choy is linked closely with the activities within the region allowing for identification of opportunities and cooperation between USPACOM and NOAA, and better overall government function situational awareness in the region.

## Department of Defense – U.S. Northern Command

**Location:** Boulder, Colorado

**Embedded Liaison:** Captain Catherine Martin

The U.S. Northern Command (USNORTHCOM) area of responsibility includes air, land and sea approaches and encompasses the continental United States, Alaska, Canada, Mexico and the surrounding water out to approximately 500 nautical miles. It also includes the Gulf of Mexico, the Straits of Florida, and portions of the Caribbean region to include The Bahamas, Puerto Rico, and the U.S. Virgin Islands. The commander of USNORTHCOM is responsible for

theater security cooperation with Canada, Mexico, and The Bahamas. The embedded NOAA liaison is linked closely with the activities within the region allowing for identification of opportunities and cooperation between USNORTHCOM and NOAA, and serves as a liaison between fostering greater situational awareness of NOAA response activities to natural disasters and Arctic activities.

#### **Department of Defense – U.S. Navy**

**Location:** Stennis Space Center, Mississippi

**Embedded Liaison:** Lieutenant (junior grade) Garrison Grant

Embedded in the Navy's Naval Oceanography Mine Warfare Center, Lieutenant (junior grade) Garrison Grant works side by side with Navy officers operating Unmanned Underwater Vehicles worldwide and is currently stationed at Stennis Space Center. This collaboration will provide knowledge and experience that will keep NOAA on the cutting edge of this emerging technology as well as strengthen the partnership between NOAA and the Navy.

#### **Department of Homeland Security – U.S. Coast Guard**

**Location:** Washington, District of Columbia

**Embedded Liaison:** Captain Kurt Zegowitz

As the NOAA liaison to the United States Coast Guard (USCG), Captain Zegowitz maintains a current and comprehensive knowledge of interagency activities and policies related to the USCG and NOAA. He identifies potential conflicts or benefits issues for analysis and evaluation, conducts appropriate assessments and studies, and serves as the interface between NOAA and the USCG. Captain Zegowitz initiates, designs, and implements strategies through federal agency liaison and coordination that results in cooperative arrangements for maritime security, oceanographic research, hazardous materials spill response, and many other activities.



# Teacher at Sea Program



The mission of NOAA's [Teacher at Sea Program](#) (TAS) is to provide teachers hands-on, real-world research experience working at sea with world-renowned NOAA scientists, thereby giving them unique insight into oceanic and atmospheric research crucial to the nation. The program provides a unique opportunity for kindergarten through college-level teachers to sail aboard NOAA research ships and work under the tutelage of scientists and crew.

Since its inception in 1990, the program has enabled more than 800 teachers to gain first-hand experience of science and life at sea. By participating in this program, teachers enrich their classroom curricula with knowledge that can only be gained by living and working side-by-side, day and night, with those who contribute to the world's body of oceanic and atmospheric scientific knowledge. Former teacher at sea [blogs](#) can be accessed, which document their missions at sea and offer a wealth of information about the research being conducted as well as personal stories.

The 2019 TAS Field Season commenced in May. Five educators are getting underway on NOAA ships in July:

**06/24/2019 - 07/15/2019** - Erica Marlaine (Nevada Avenue Elementary School, Canoga Park, California) will sail on a Gulf of Alaska pollock survey in and out of Kodiak, Alaska, on NOAA Ship *Oscar Dyson*.

**07/08/2019 - 07/19/2019** - Meg Stewart (West Bronx Academy for the Future, Bronx, New York) will sail on a hydrographic survey from Nome, Alaska, to Dutch Harbor, Alaska, on NOAA Ship *Fairweather*.

**07/08/2019 - 07/19/2019** - Hayden Roberts (Western Heights Public Schools, Oklahoma City, Oklahoma) will sail on a groundfish survey in and out of Pascagoula, Mississippi, on NOAA Ship *Oregon II*.

**07/15/2019 - 07/29/2019** - David Madden (Maclay School, Tallahassee, Florida) will sail on the Southeast Fishery-Independent Survey in and out of Morehead City, North Carolina, on NOAA Ship *Pisces*.

**07/19/2019 - 08/08/2019** - Jessica Cobley (Floyd Dryden Middle School, Juneau, Alaska) will sail on a Gulf of Alaska pollock survey in and out of Kodiak, Alaska, on NOAA Ship *Oscar Dyson*.

Additionally, two teachers are sailing aboard partner agency vessels.

**06/28/2019 - 07/19/2019** - Catherine Fuller (Iolani School, Honolulu, Hawaii) will sail on the Northern Gulf of Alaska Long-Term Ecological Research Survey (through a partnership with University of Alaska-Fairbanks) in and out of Seward, Alaska, on NSF R/V *Sikuliaq*.

**07/18/2019 - 07/26/2019** - Shelley Gordon (Roosevelt Middle School, Oakland, California) will sail on the Cordell Bank Applied California Current Ecosystem Studies (ACCESS) survey in and out of Sausalito, California, on R/V *Fulmar*.



NOAA Teacher at Sea, Lona Hall, of Gainesville, Georgia, enjoying a sunny day aboard NOAA Ship *Rainier* in Seward, Alaska.

(Photo Credit: NOAA)



# OMAO - NOAA Diving Program



Seattle, Washington

## NOAA Diving Center and Program

OMAO manages and implements [NOAA's Diving Program \(NDP\)](#), which trains and certifies scientists, engineers, and technicians from federal, state, tribal governments, and the private sector to perform the variety of tasks carried out underwater to support NOAA's mission. NDP also has cooperative diving agreements with over 100 government agencies and academic institutions. NOAA has approximately 350 divers who perform over 8,000 dives per year and leverages its cooperative agreements to accomplish twice that number of dives contributing to scientific research. The NDP is headquartered at the NOAA Diving Center (NDC), which is located at the NOAA Western Regional Center in Seattle, Washington.

Just before Memorial Day weekend, the NOAA Diving Center graduated 14 new NOAA Divers. During the last half of class, the prospective divers gained familiarity with some real working tasks including a hull dive on the University of Washington's research vessel R/V *Rachel Carson*. Students also worked with lift bags, used underwater pneumatic tools to install mock mooring anchors, and practiced underwater search and survey techniques. The class was attended by NOAA Corps Officers, Wage Mariners, NOS Contractors, as well as some local public safety divers.



Congratulations to the 14 new NOAA Divers who attended the May training course in Seattle, Washington.

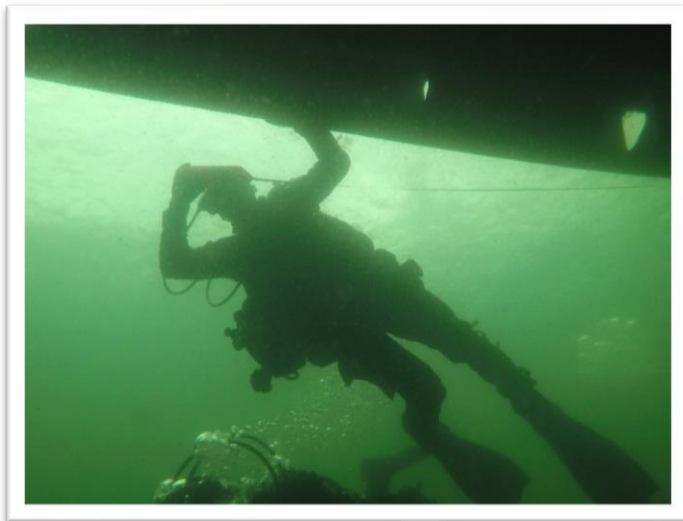
[Photo Credit: NOAA Dive Center]

The work is not complete after the training is done! NDC Staff conducted a thorough debrief and took a critical look at the curriculum and methods being taught. Continuous improvement of training content to offer the best possible product and respond to field needs is one of the main goals of the NOAA Diving Center.

"Downtime" between classes is a misnomer as the field season for diving is just starting to ramp up. In support of upcoming *Rainier* diving missions in Hawaii, NDC instructor Katie Mahaffey flew down to Honolulu to teach a one-week Dive Medical Technician (DMT) refresher course. Other NDC Staff members are also working to support *Rainier* by

offering their expertise in hyperbaric chambers. Adapting a chamber originally fitted for NOAA Ship *Hi'ialakai* to fit on NOAA Ship *Rainier* is no small feat, but divers are known to adapt and overcome without compromising safety. Zach Hileman and Joe Mangiafico recently answered a need for field support at the Flower Garden Banks National Marine Sanctuary. They will be sailing aboard the *R/V Manta* for a survey involving the use of Diver Propulsion Vehicles (DPVs).

July and August are shaping up to be quite busy at NDC as many staff members will be sailing as hyperbaric chamber supervisors on NOAA Ships *Oscar Elton Sette* and *Rainier*. Back in Seattle, the Western Regional Center will be hosting Science Camp and NDC will be showcasing some of the equipment and science behind diving to local middle school students.



A NOAA Diver student takes measurements of hull features during a ship husbandry dive under R/V *Rachel Carson* (left).

A NOAA Diver student uses a lift bag to bring an object to the surface (right).

[Photo Credit: NOAA Dive Center]





# NOAA Small Boat Program



Oversight of the NOAA Small Boat Fleet is a collaboration across OMAO, NMFS, NOS, OAR and NWS. The Small Boat Program (SBP) was established in 2004 to create policies and procedures to ensure safety in support of NOAA's field operations. Direction, technical and administrative support is provided by OMAO through the NOAA Small Boat Program Office. NOAA Line and Program Offices are responsible for acquisitions, operational funding and mission support. The NOAA Small Boat Safety Board is comprised of line offices, SBP, and SECO representatives and is charged with initiating policies and training, program metrics, and compliance.

In addition to its ships and aircraft, NOAA relies on hundreds of small boats located throughout the country to complete the organization's complex and varied scientific missions. The NOAA Small Boat Program is committed to supporting the safe operation of these small boats through the principles of risk management.

The NOAA Small Boat Program manages a fleet of about 400 small boats that perform various data collection missions for NOAA throughout the United States and its territories including hydrographic surveys, fishing, diving, scientific instrument deployment/recovery, water and air quality monitoring, law enforcement and marine mammal surveys. Vessels vary in size from a simple 10-ft. kayak to a complex 85 foot research vessel. The majority of small boats fall within the range of 16-26 feet in length and operate in near-shore environments, but extended missions in deep water environments are common among the larger vessels.

The NOAA Small Boat Program has developed specific hardware, software and operational requirements governing the use of electronic navigation on NOAA Class III small boats and Small Research Vessel's. The policy recognizes the recent advancements in chart plotting technologies and further defines the requirements for navigation resources required by the Small Boat Standards and Procedures Manual. Operators may now use Electronic Navigation Charts in lieu of paper charts provided that all required elements of the policy are adhered to.



R/V Shearwater located at NOAA's Channel Islands National Marine Sanctuary

[Photo Credit: NOAA]



# Office of Marine & Aviation Operations

Providing Environmental Intelligence for a Dynamic World



The personnel, ships, and aircraft of NOAA play a critical role in gathering environmental data vital to the nation's economic security, the safety of its citizens, and the understanding, protection, and management of our natural resources. The NOAA fleet of ships and aircraft is managed and operated by the Office of Marine and Aviation Operations (OMAO), an office comprising civilians, mariners, and officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States. NOAA's roots trace back to 1807 when President Thomas Jefferson ordered the first comprehensive coastal survey. Those early surveys ensured safe passage of ship-borne cargo for a young nation. As the needs of the nation have grown, so too have OMAO's responsibilities. Today, OMAO civilians and NOAA Corps officers operate, manage, and maintain NOAA's active fleet of 16 research and survey ships and nine specialized aircraft. Together, OMAO and the NOAA Corps support nearly all of NOAA's missions.



NOAA has the largest fleet of federal research and survey ships in the nation. The fleet ranges from large oceanographic ships capable of exploring and charting the world's deepest ocean, to smaller vessels responsible for surveying the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries surveys, nautical charting, and ocean and climate studies. Based throughout the continental United States, Alaska, and Hawaii, the ships operate in all regions of the nation and around the world.

NOAA's aircraft provide a wide range of airborne capabilities. Our highly specialized Lockheed WP-3D aircraft are equipped with an unprecedented variety of scientific instrumentation, radars, and recording systems for both in situ and remote sensing measurements of the atmosphere, the Earth, and its environment. Equipped with both C-band weather radar and X-band tail Doppler radar systems, the WP-3Ds have the unique ability to conduct tropical cyclone research in addition to storm reconnaissance. Together with NOAA's Gulfstream IV-SP jet, these 'hurricane hunter' aircraft greatly improve our physical understanding of hurricanes and enhance the accuracy of tropical cyclone forecasts. NOAA's light aircraft also play a vital role in monitoring our environment. Our King Air, Turbo Prop Commander, and Twin Otter aircraft support marine mammal population studies, shoreline change assessments, oil spill investigations, and water resource/snowpack surveys for spring flood forecasts.



The NOAA fleet provides immediate response capabilities for unpredictable events. For example, during the 2018 Hurricane season NOAA flight crews and scientists flew a combined 556.8 hours for hurricane surveillance, research, reconnaissance, and emergency response. NOAA's Lockheed WP-3D and Gulfstream IV-SP collected and provided vital data used by NOAA scientists for improved modeling, forecasting, and ensuring accurate forecasts provided to the public. NOAA's Beechcraft King Air 350 rapidly responded to demand from emergency managers, using state-of-the-art equipment to collect thousands of aerial images from Cape Henry, Virginia to Charleston, South Carolina of damaged communities following Hurricane Florence. This imagery provided a cost-effective way to better understand the damage sustained to both property and the environment. NOAA Ship Ferdinand R. Hassler surveyed eastern North Carolina for multiple days in order to ensure vessels could safely navigate the area. This year NOAA Ship Thomas Jefferson conducted 66 days of post Hurricane Maria survey operations around Puerto Rico and the U.S Virgin Islands to support the area's recovery efforts following the destructive 2017 storm.

While manned aircraft and sea-going vessels have been, and will continue to be, a primary source of environmental data, new technology will have a significant role to play in the future NOAA fleet. OMAO, in coordination with other NOAA offices and federal agencies, is evaluating and deploying unmanned aerial and underwater systems that could significantly contribute to environmental observations. To better serve the needs of the Nation, NOAA is examining the composition of the fleet through an exhaustive and critical review of at-sea science and observation requirements. Our objective is to develop a clear, cost-efficient path forward to ensure that the NOAA fleet can continue to conduct at-sea surveys and research vital to fisheries management, updating nautical charts, responding to natural and manmade disasters, and understanding coastal and marine systems more fully. Meeting these requirements is essential to the development of sustainable, science-based management and conservation plans that protect the health and resiliency of these resources over the long-term.

We continue our efforts to build a civilian and NOAA Corps officer workforce that is uniquely qualified to gather critical environmental intelligence and be adaptive and responsive to a changing world and work to expand our partnerships with other federal agencies. For example, NOAA Corps officers are currently assigned to work in the Department of Defense, National Science Foundation, and the U.S. House Representatives among others where they lend their leadership, expertise and service. We also continue to strengthen our partnership with the Department of Homeland Security through the U.S. Coast Guard. Our basic NOAA Corps officer training class is held at the U.S. Coast Guard Academy, where newly commissioned officers train alongside Coast Guard officer candidates, developing skills and professional relationships that will benefit both services, especially during challenging times. Active collaboration the Federal family is critical to ensuring the long-term capability and success of the federal ocean infrastructure. Our partners' success is our success.



# NOAA Commissioned Officer Corps



– Honor, Respect, Commitment –

The NOAA Commissioned Officer Corps is one of the United States' seven Uniformed Services and commissioned officers serve with the 'special trust and confidence' of the President. NOAA Corps officers are an integral part of the National Oceanic and Atmospheric Administration, an agency of the U.S. Department of Commerce. With an authorized strength of 321 officers, the NOAA Corps serves throughout the agency's Line and Staff Offices to support nearly all of NOAA's programs and missions. The combination of commissioned service and scientific expertise makes these officers uniquely capable of leading some of NOAA's most important initiatives. The NOAA Corps is part of NOAA's Office of Marine and Aviation Operations and traces its roots back to the former U.S. Coast and Geodetic Survey, which dates back to 1807 and President Thomas Jefferson. The U.S. Coast and Geodetic Survey Corps was founded in 1917 to provide officers to command U.S. coastal survey ships and field survey parties locally and abroad. In 1970, NOAA was created to develop a coordinated approach to oceanographic and atmospheric research and subsequent legislation converted the commissioned officer corps to the NOAA Corps. The NOAA Corps today provides a cadre of professionals trained in engineering, earth sciences, oceanography, meteorology, fisheries science, and other related disciplines. Corps officers operate NOAA's ships, fly aircraft, manage research projects, conduct diving operations, and serve in staff positions throughout NOAA. The NOAA Corps celebrated its Centennial year in 2017.

## Benefits of the NOAA Corps to the Nation

The combination of commissioned service with scientific and operational expertise, allows the NOAA Corps to provide a unique and indispensable service to the nation. Discipline and flexibility are inherent in the NOAA Corps personnel system. Officers are trained for positions of leadership and command in the operation of ships and aircraft; in the conduct of field projects on land, at and under the sea, and in the air; in the management of NOAA observational and support facilities; as members or leaders of research efforts; and in the management of various organizational elements throughout NOAA. NOAA Corps officers must be technically competent to assume positions of leadership and command in NOAA and Department of Commerce programs and in the Armed Forces during times of war or national emergency. NOAA Corps officers enable NOAA to fulfill mission requirements, meet changing environmental concerns, take advantage of emerging technologies, and serve as environmental first responders. For example:

- In 2018, NOAA aircraft flew over 556 hours in support of storm reconnaissance, surveillance, research and emergency response. NOAA assets were deployed to the Central Pacific for Hurricanes Hector, Lane and Norman and performed multiple operations in the Gulf of Mexico, North Atlantic and the Caribbean for Hurricanes Chris, Florence, Gordon, Isaac, and Michael. In response to Hurricane Florence, NOAA Ship Ferdinand R. Hassler surveyed eastern North Carolina for multiple days in order to ensure vessels could safely navigate the area. NOAA Ship Thomas Jefferson conducted 66 days of post-Hurricane Maria surveys in and around Puerto Rico to support the island's recovery efforts.
- In 2017, NOAA aircraft flew over 600 hours in support of storm reconnaissance, surveillance, research, and emergency response for Hurricanes Harvey, Irma, Jose, Maria, and Nate. NOAA Ship Thomas Jefferson conducted post-storm surveys of waterways of Puerto Rico following Hurricane Maria to help re-open the ports for maritime delivery of critical supplies to the island.
- The BP Deepwater Horizon oil spill was the worst oil disaster in U.S. history. The NOAA fleet and the NOAA Corps played a major role in the response to the Deepwater Horizon oil spill. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf of Mexico following this devastating event.



# OMAO/NOAA Corps Resources



## OMAO Sites

- [OMAO](#)
- [NOAA Corps](#)

## Two Pagers, Reports, and Informational Slide Decks

- **Monthly NOAA Fleet Update** - The latest version is provided to Committee staff and is also available through the Office of Legislative and Intergovernmental Affairs.
- **Monthly Aircraft Flights and Mission Info Summary** - The latest version is available through the Office of Legislative and Intergovernmental Affairs.
- [Tornado Formation, Intensity, and Path for the Southeast United States: Research Flight and Mission Info Recap](#) – 2018
- [Hurricane Lane Flight and Mission Info Recap](#) - 2018
- [OMAO two pager with Recent Mission Highlights](#) – 2018
- [OMAO Fleet Recapitalization Slide Deck – Building NOAA's 21st Century Fleet](#)
- [OMAO Fleet Recapitalization Questions and Answers \(Q&As\)](#)
- [NOAA Fleet Independent Review Team Final Report](#)
- [The NOAA Fleet Plan: Building NOAA's 21st Century Fleet](#)

## Other Web Resources

- [OMAO Marine Operations](#)
- [OMAO Aircraft Operations](#)
- [OMAO on Facebook](#)
- [Hurricane Hunters on Facebook](#)
- [OMAO on Twitter](#)
- [Hurricane Hunters on Twitter](#)
- [OMAO Ship Tracker](#) - (restricted to only .gov or .mil users)